

CLAIMS

It is claimed:

1. A method for modifying a catalytic molecular sieve which comprises:
 - a) selectivating said catalytic molecular sieve by contacting with a silicon containing selectivating agent; and
 - b) calcining the selectivated catalytic molecular sieve at high temperature calcination conditions comprising temperatures greater than 700°C, which conditions are sufficient to reduce acid activity as measured by alpha value and increase diffusion barrier of said catalytic molecular sieve as measured by the rate of 2,3-dimethylbutane uptake, as compared to the selectivated catalytic molecular sieve.
2. A method for modifying a catalytic molecular sieve for shape-selective hydrocarbon conversions which comprises:
 - a) selectivating said catalytic molecular sieve by contacting with a silicon containing selectivating agent; and
 - b) calcining the selectivated catalytic molecular sieve at high temperature calcination conditions comprising temperatures greater than 700°C, which conditions are sufficient to reduce acid activity as measured by alpha value and increase diffusion barrier of said catalytic molecular sieve as measured by the rate of 2,3-dimethylbutane uptake by at least 25%, as compared to the selectivated catalyst.
3. The method of claim 2 wherein said catalytic molecular sieve is selected from the group consisting of ZSM-5, ZSM-11, ZSM-12, ZSM-22, ZSM-23, ZSM-35, ZSM-48, ZSM-50, ZSM-57, ZSM-58, zeolite beta, MCM-22, MCM-36, MCM-49, MCM-56, mordenite, MCM-58, synthetic faujasite, natural faujasite, MCM-41, ALPO-5, VPI-5, SAPO-5, SAPO-11, SAPO-30, SAPO-31, SAPO-34, ITQ-2, ITQ-3, ITQ-12, and ITQ-13.

4. The method of claim 3 wherein said catalytic molecular sieve is a silica-bound ZSM-5.
5. The method of claim 2 wherein said catalytic molecular sieve comprises a metal of a group selected from Group VIIIA, Group VIIA, Group VIA, Group VB, Group IVB, Group IIB, Group IIA, and Group IB of the Periodic Table.
6. The method of claim 2 wherein said catalytic molecular sieve comprises a hydrogenation metal selected from the group consisting of platinum, palladium, iron, nickel, gallium, zinc, molybdenum, and rhenium.
7. The method of claim 2 wherein said selectivating agent is selected from the group consisting of polysiloxanes, siloxanes, silanes, disilanes and alkoxysilanes.
8. The method of claim 2 wherein said selectivating is carried out by two to six treatments with a selectivating agent.
9. The method of claim 2 wherein said calcining is carried out under conditions sufficient to provide a catalytic molecular sieve having an alpha value of less than 700 and a diffusion barrier as measured by the rate of 2,3-dimethylbutane uptake of less than $270 (D/(r^2 \times 10^6 \text{ sec}))$.
10. The method of claim 2 wherein said calcining is carried out under conditions sufficient to provide a catalytic molecular sieve having an alpha value ranging from 25 to 200 and a diffusion barrier as measured by the rate of 2,3-dimethylbutane uptake of less than $150 (D/(r^2 \times 10^6 \text{ sec}))$.
11. The method of claim 2 wherein said calcining is carried out under conditions sufficient to provide a catalytic molecular sieve having an alpha value ranging from 5 to 25.

12. The method of claim 2 wherein said calcining is carried out at temperatures ranging from greater than 700° to 1200°C for 0.1 to 12 hours.
13. The catalytic molecular sieve of claim 12 wherein said catalytic molecular sieve is a silica-bound ZSM-5 and further comprising a hydrogenation metal selected from the group consisting of platinum, palladium, iron, molybdenum, and rhenium.
14. A method for shape-selective hydrocarbon conversion which comprises:
- i) selectivating a catalytic molecular sieve by contacting with a silicon-containing selectivating agent;
 - ii) calcining the selectivated catalytic molecular sieve at high temperature calcination conditions comprising temperatures greater than 700°C, which conditions are sufficient to reduce acid activity as measured by alpha value and increase diffusion barrier of said catalytic molecular sieve as measured by the rate of 2,3-dimethylbutane uptake, as compared to the selectivated catalytic molecular sieve, to provide a high temperature calcined catalytic molecular sieve, and
 - iii) contacting a hydrocarbon feed under hydrocarbon conversion conditions with said high temperature calcined catalytic molecular sieve.
15. The method of claim 14 wherein said shape-selective hydrocarbon conversion is selected from the group consisting of catalytic cracking, aromatics disproportionation, aromatics isomerization, aromatic alkylation, catalytic dewaxing and naphtha reforming.
16. The method of claim 14 wherein said shape-selective hydrocarbon conversion is toluene disproportionation.
17. The method of claim 14 wherein said shape-selective hydrocarbon conversion is xylene isomerization.

18. The method of claim 1 wherein said diffusion barrier is increased by at least 25%.

19. The method of claim 2 wherein said diffusion barrier is increased by at least 35%.

20. The method of claim 2 wherein said diffusion barrier is increased by at least 50%.